Horseshoe

Horseshoe Overview

Volunteer monitoring began at Horseshoe Lake in water year 2000 and continued from 2002 through 2004. The data indicate that this rural lake is moderate to high in primary productivity (mesotrophic to eutrophic), with good to fair water quality.

Horseshoe Lake has no public access boat launch, and widely fluctuating water levels may make invasion by noxious aquatic weeds unlikely over the long term.

Physical Parameters

Secchi transparency ranged between 0.5 and 2.7 m through the sampling season, averaging 1.9 m which was in the lower range for monitored small lakes in 2004. Surface water temperatures reached a maximum of 25.0 degrees Celsius, which was in the mid range for the group.

There were no precipitation or lake level records for the year.

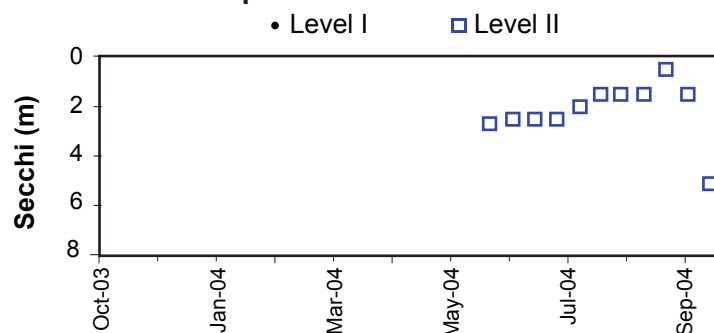## Nutrient Analysis and TSI Ratings

Both total nitrogen and phosphorus rose slowly through most of the sampling season, remaining in fairly constant proportion to each other. The N:P ratio ranged from 15 to 40, averaging 31 and generally suggesting unfavorable conditions for bluegreen growth.
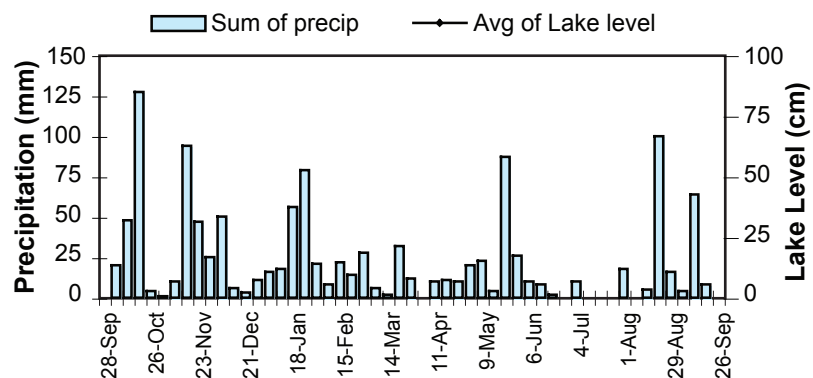
Lake Temperature
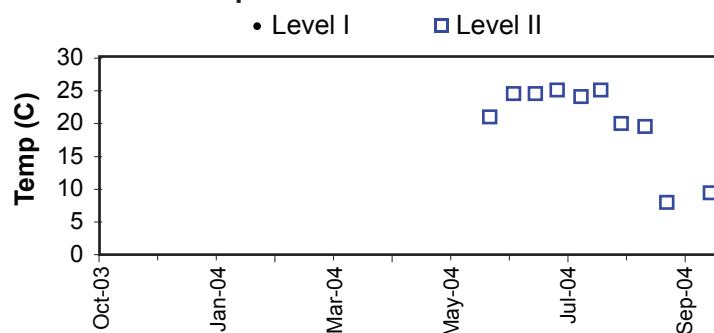
Secchi Depth

Lake Level and Precipitation

Nutrient Analysis
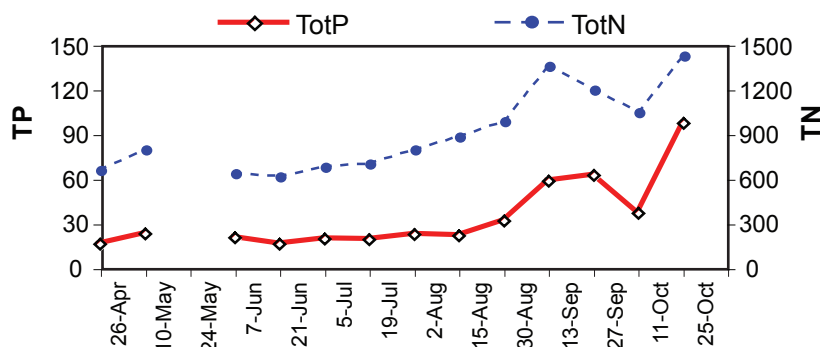
Horseshoe Lake is too shallow for profile sampling to provide important information.

The 2004 TSI indicators were very close to each other on the threshold between the mesotrophic and eutrophic categories. This is significantly higher than previous years, which were in the mid range for mesotrophy.

Chlorophyll Concentrations and Algae

Chlorophyll content at 1m generally followed the nutrient curves, reaching the highest concentration in late October. The dominant algae included the chrysophyte *Dinobryon*, several unidentified species of chrysophytes, the colony-forming chlorophytes *Oocystis* and *Scenedesmus arcuatus*, and several species of cryptophytes. Bluegreen algae were extremely rare.

Date	Secchi	depth-m	degC	Chlor-A	TP µg/L	TN µg/L
NO DATA AVAILABLE						

TSI Ratings

Chlorophyll a Concentrations (ug/L)
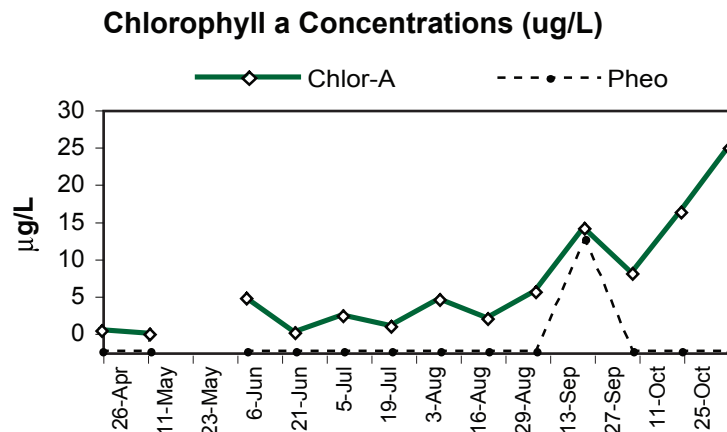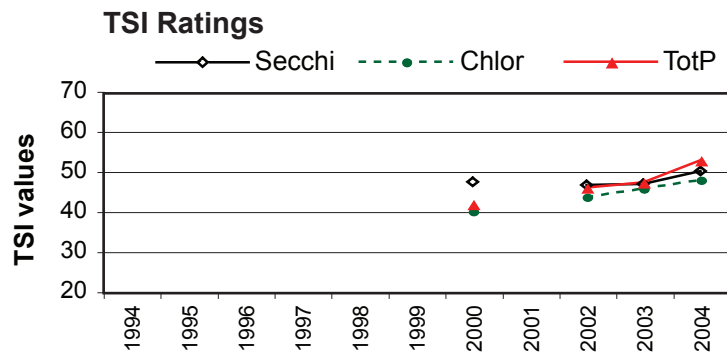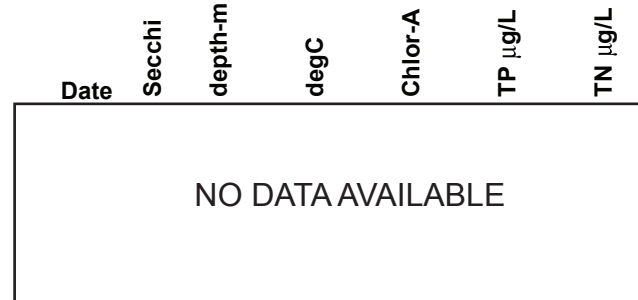
Common Algae

	Group
Dinobryon sp	Chrysophyta
Cryptomonas sp	Cryptophyta
Scenedesmus spp	Chlorophyta

Horseshoe

2004 Level I Data

Daily Data Summary					Weekly Data Summary						
Week of	Sum of precip. (mm)	# of days	Avg of lake level (cm)	# of days	Sample date	Sample time	Secchi (m)	Temp (°C)	Algae* (Shore)	Algae* (at site)	Goose Count*
28-Sep-03	0.0	0									
5-Oct-03	20.0	3									
12-Oct-03	48.0	7									
19-Oct-03	127.0	5									
26-Oct-03	4.0	2									
2-Nov-03	1.0	7									
9-Nov-03	10.0	7									
16-Nov-03	94.0	7									
23-Nov-03	47.0	7									
30-Nov-03	25.0	7									
7-Dec-03	50.0	7									
14-Dec-03	6.0	7									
21-Dec-03	3.0	7									
28-Dec-03	11.0	7									
4-Jan-04	16.0	7									
11-Jan-04	18.0	7									
18-Jan-04	56.0	7									
25-Jan-04	79.0	7									
1-Feb-04	21.0	7									
8-Feb-04	8.0	7									
15-Feb-04	22.0	7									
22-Feb-04	14.0	7									
29-Feb-04	28.0	5									
7-Mar-04	6.0	7									
14-Mar-04	2.0	7									
21-Mar-04	32.0	7									
28-Mar-04	12.0	4									
4-Apr-04	0.0	7									
11-Apr-04	10.0	7									
18-Apr-04	11.0	7									
25-Apr-04	10.0	7									
2-May-04	20.0	7									
9-May-04	23.0	6									
16-May-04	4.0	7									
23-May-04	87.0	5									
30-May-04	26.0	7									
6-Jun-04	10.0	7									
13-Jun-04	8.0	7									
20-Jun-04	2.0	7									
27-Jun-04	0.0	7									
4-Jul-04	10.0	7									
11-Jul-04	0.0	7									
18-Jul-04	0.0	7									
25-Jul-04	0.0	7									
1-Aug-04	18.0	7									
8-Aug-04	0.0	7									
15-Aug-04	5.0	7									
22-Aug-04	100.0	3									
29-Aug-04	16.0	7									
5-Sep-04	4.0	6									
12-Sep-04	64.0	6									
19-Sep-04	8.0	7									
26-Sep-04	0.0	5									
Min	0.0		0.0		**Min**		0.0	0.0			
Max	127.0		0.0		**Max**		0.0	0.0			
Total	1196.0										

* See introduction for discussion of algae assessment and goose count methods.

2004 Level II Data

Date (2004)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI		
								Secc	chl-a	TP
26-Apr	16.0	NR	2.56	16.9	668		40		39.8	44.9
11-May	15.0	3.0	2.08	23.7	809	1	34	44.1	37.8	49.8
23-May	20.0	2.5				2		46.8		
6-Jun	21.0	2.7	6.57	21.1	647	1	31	45.7	49.0	48.1
21-Jun	24.5	2.5	2.24	16.8	626	2	37	46.8	38.5	44.9
5-Jul	24.5	2.5	4.33	20.4	693	1	34	46.8	44.9	47.7
19-Jul	25.0	2.5	3.04	19.9	715	1	36	46.8	41.5	47.3
3-Aug	24.0	2.0	6.41	23.5	810	2	34	50.0	48.8	49.7
16-Aug	25.0	1.5	4.01	22.6	894	2	40	54.1	44.2	49.1
29-Aug	20.0	1.5	7.37	32.5	1000	1	31	54.1	50.2	54.4
13-Sep	19.5	1.5	15.25	59.4	1370	1	23	54.1	57.3	63.1
27-Sep	8.0	0.5	9.61	63.0	1210	1	19	70.0	52.8	63.9
11-Oct	NR	1.5	17.20	37.8	1060	2	28	54.1	58.5	56.6
25-Oct	9.5	5.1	25.20	98.1	1440	1	15	36.5	62.2	70.3
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae	N:P	Calculated TSI		
								Secc	chl-a	TP
Mean	19.4	2.3	8.1	35.1	918.6	1.4	31	50.0	48.1	53.1
Median	20.0	2.5	6.4	23.5	810.0	1	34	46.8	48.8	49.7
Min	8.0	0.5	2.1	16.8	626.0	1	15	36.5	37.8	44.9
Max	25.0	5.1	25.2	98.1	1440.0	2	40	70.0	62.2	70.3
Count	13	13	13	13	13	13	13	13	13	13

TSI Average = 50.4